

1. A resonant circuit, comprising:
  - a transformer having a primary winding, a first secondary winding, and a feedback secondary winding, wherein the first secondary winding is electrically connected to the primary winding with a node at AC ground disposed between the first secondary winding and the primary winding; and
  - a balance inductor coupled to the first secondary winding,
  - wherein the feedback secondary winding is coupled to the balance inductor such that the feedback secondary winding, the balance inductor and the first secondary winding provide a circuit path, and the feedback secondary winding can provide a feedback path for a feedback signal to an input rectifying circuit.
2. The circuit according to claim 1, wherein the first secondary winding has an impedance that is substantially equivalent to an impedance of the feedback secondary winding.
3. The circuit according to claim 2, wherein, during circuit operation, voltages across the first secondary winding and the feedback secondary winding substantially cancel each other such that a voltage across the balance inductor is provided to the input rectifying circuit on the feedback path.
4. The circuit according to claim 1, further including a series capacitor coupled in series with the feedback secondary winding.
5. The circuit according to claim 4, wherein the series capacitor and the balance inductor provide a series resonant circuit.
6. The circuit according to claim 1, further including a first circuit loop that includes the primary winding, the first secondary winding, the balance inductor, at least one pair of lamp terminals for receiving a lamp, and a second secondary winding.

7. The circuit according to claim 1, wherein an AC ground is located between the feedback secondary winding and the input rectifying circuit when the circuit is energized and the load is removed.

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8. The circuit according to claim 2, wherein the balance inductor provides a substantially sinusoidal line current waveform.

9. The circuit according to claim 1, further including a plurality of lamp terminal pairs  
10 connected between the primary winding and the balance inductor.

10. The circuit according to claim 1, wherein the feedback signal provides a current that is proportional to a load current.

15 11. The circuit according to claim 1, wherein a line current remains substantially sinusoidal as a load changes due to removal/addition of lamps.

12. The circuit according to claim 1, wherein the circuit provides a THD of less than 10 percent.

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13. The circuit according to claim 1, wherein the circuit provides a Power Factor (PF) of greater than 99 percent.

14. The circuit according to claim 1, wherein the circuit includes a voltage doubler to  
25 receive the feedback signal.

15. The circuit according to claim 1, wherein the circuit includes a full wave rectifier circuit to receive the feedback signal.

16. The circuit according to claim 1, further including a first input terminal, a second input terminal for receiving a first input signal, and a third input terminal for receiving a second input signal, a first signal detector for detecting the first input signal, a second signal detector for detecting the second input signal, a first lamp group control circuit  
5 coupled to the first signal detector for controlling a first lamp group, a second lamp group control circuit coupled to the second signal detector for controlling a second lamp group, wherein the first and second lamp control circuits independently control the respective first and second lamp groups based upon a presence of the respective first and second input signals.

10 17. The circuit according to claim 16, wherein the first lamp control circuit is coupled to the balance inductor.

18. The circuit according to claim 17, further including a single ballast adapted for  
15 coupling to first and second lamp switches to independently control the first and second lamp groups.

19. A lamp ballast circuit, comprising:

a resonant inverter including

20 a transformer having a primary winding, a first secondary winding and a feedback secondary winding, wherein the primary winding corresponds to a resonant inductive element of the resonant inverter, the first secondary winding being electrically coupled to an end of the primary winding such that voltages on the primary winding and the first secondary winding are adapted for being additively applied across a load; and

25 a balance inductor coupled between the first secondary winding and the feedback secondary winding,

wherein the feedback secondary winding is adapted to provide a feedback signal on a feedback path to an input rectifying circuit.

20. The ballast according to claim 19, wherein the first secondary winding the feedback secondary windings have substantially equivalent impedances to cancel respective voltages.

5 21. The ballast according to claim 21, wherein the balance inductor provides a substantially sinusoidal waveform to the input rectifying circuit.

22. The ballast according to claim 19, further including a plurality of lamp terminal pairs coupled between a second secondary winding and the balance inductor.

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23. The ballast according to claim 19, further including a first circuit loop having the primary winding, the first secondary winding, the balance inductor, a plurality of lamp terminal pairs connected in parallel, and a second secondary winding.

15 24. The ballast according to claim 23, further including a first circuit path extending from the rectifier circuit through a series capacitor and the feedback secondary winding, wherein the feedback secondary winding is connected to the balance inductor.

25. A method of providing feedback in a resonant circuit, comprising:

20 connecting in a first circuit loop a primary winding, a first secondary winding, a balance inductor, and at least a pair of lamp terminals; and

connecting a feedback secondary winding to a rectifier circuit to provide a feedback signal on a feedback path from the first circuit loop to the rectifier circuit.

25 26. The method according to claim 25, further including selecting respective impedances for the first and feedback secondary windings that substantially cancel each other.

27. The method according to claim 26, further including selecting an impedance for the balance inductor to generate a substantially sinusoidal signal on the feedback path.

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28. The method according to claim 25, further including providing a THD of less than about 10 percent.

5 29. The method according to claim 25, further including connecting a series capacitor in the feedback path.

30. The method according to claim 25 further including providing an AC ground at a point between the rectifier and the feedback secondary winding, whenever the circuit is activated and the load is removed.

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31. The method according to claim 25, further including providing a voltage doubler configuration for the rectifier circuit.

15 32. The method according to claim 25, further including coupling a first lamp group control circuit to the first circuit loop to control a first group of lamps.

33. The method according to claim 32, further including coupling a second lamp group control circuit to the first circuit loop to control a second group of lamps independently from the first group of lamps.

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34. The method according to claim 33, further including providing a first signal corresponding to a presence of a signal on a first input terminal to the circuit to the first lamp group control circuit.

25 35. The method according to claim 34, further including providing a second signal corresponding to a presence of a signal on a second input terminal to the circuit to the second group control circuit.

36. A method of providing feedback in a ballast, comprising:

providing a resonant circuit including a resonant inductive element having a primary winding with first and second ends;

providing a first secondary winding having first and second ends and coupling the first end of the primary winding to the first end of the first secondary winding;

providing a second secondary winding having first and second ends and coupling the second end of the primary winding to the first end of the second secondary winding;

providing a balance impedance having first and second end and coupling the first end of the balance inductor to the second end of the first secondary winding;

providing a third secondary winding having first and second ends and coupling the second end of the third secondary winding to the second end of the balance impedance, wherein the first end of the third secondary winding is adapted for coupling to a rectifier circuit to provide a feedback signal;

providing at least one pair of lamp terminals comprising first and second lamp terminals to energize a lamp and coupling the second lamp terminal to the second end of the balance inductor and coupling the first lamp terminal to the second end of the second secondary winding.

37. The method according to claim 36, further including providing a first AC ground at the first end of the primary winding.

38. The method according to claim 37, further including providing a second AC ground at the first end of the third secondary winding, whenever the circuit is activated and the load removed.